

Notice of Allowability

Application No.

09/817,447

Examiner

James M. Mitchell

Applicant(s)

AHN ET AL.

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 9/8/2003.
2. ☒ The allowed claim(s) is/are 38-76.
3. ☒ The drawings filed on 26 March 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

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DETAILED ACTION

This office action is in response to the granting of the petition to revive filed September 8, 2003.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Eduardo Drake on January 21, 2005.

The application has been amended as follows:

CLAIMS

Cancel claims 74 and 76.

In claim 46, line 11 after "material" insert - - ; wherein the first and second barriers are of different materials- -.

In claim 52, line 9 after "barrier" insert - - consisting of zinc oxide- -.

In claim 56, line 6 after "layer" insert - - consisting of zinc oxide- - and in line 8, after "hole" insert - - ; wherein the first and second barriers are of different materials--.

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In claim 66, line 6 after "layer" insert - - consisting of zinc oxide- - and in line 10, after "layer" insert - -; wherein the first and second barriers are of different materials--.

In claim 68, line 8 after "layer" insert - - consisting of zinc oxide- - and in line 12, after "layer" insert - -; wherein the first and second barriers are of different materials--.

In claim 70, line 9 after "layer" insert - - consisting of zinc oxide- - and in line 14, after "layer" insert - -; wherein the first and second barriers are of different materials--.

In claim 72, line 16 delete "the metal" and after "of" insert - -copper,- - and in line 17, after "layer" insert - -; wherein the first diffusion barrier layer consist essentially of a zinc oxide material and the second diffusion barrier consist essentially of tungsten, titanium-tungsten, or titanium nitride--.

Allowable Subject Matter

Claims 38-76 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art did not disclose or make obvious an integrated circuit assembly comprising utilizing zinc oxide as a second barrier material on top of a first barrier layer that is in a trench wherein the second barrier is outside of the trench and is of a different material than the first barrier, or the use of a first barrier

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consisting of zinc oxide in a trench with a second barrier on the zinc oxide outside of the trench and copper in the trench , including all the limitations of the independent claim.

While the prior in Muraoka utilizes a first barrier consisting of zinc oxide in a trench, the art teaches away from forming copper in the trench by teaching the use of aluminum. Furthermore, it fails to disclose or make obvious of alternatively forming the second barrier with zinc oxide, such that zinc oxide is not formed in the trench.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

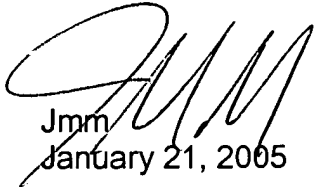
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

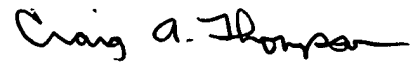
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jmm
January 21, 2005



CRAIG A. THOMPSON
PRIMARY EXAMINER